SAE Aerospace
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AEROSPACE RECOMMENDED PRACTICE

SAE ARP142

REV. B

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Assembling of Studs in Aluminum and Magnesium

FOREWORD

Changes in this revision are format/editorial only.

1. SCOPE:

   This document covers the recommended basics to be considered when assembling cadmium plated steel studs with rolled threads into cast, or forged, aluminum or magnesium parts.

2. APPLICATION:

   This specification covers a suggested procedure for the assembling of cadmium plated steel studs with rolled threads into cast or forged aluminum and magnesium.

3. ASSEMBLING TORQUE:

   Studs should be assembled with a minimum torque sufficient to resist backing out when a self locking nut is used and the maximum torque should not be great enough to damage the stud when driving. Suggested torques are given in Table 1.

4. LUBRICANT:

   Lubricants, when assembling studs, should be used with care. Anti-seize compound composed of Petrolatum and Graphite or a 240 viscosity lubricating oil or a compound composed of lead soap base grease and mineral oil may be used.

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4.1 The lubricant may be applied to the hole or the stud. It is preferred that the lubricant be applied to the hole; however, extreme care should be used so that an excess amount of lubricant will not cause the stud to hydraulic in a blind hole. Use only sufficient lubricant to cover the sides of the threads with a thin layer.

5. SELECTION OF TAP:

A tap should be selected to produce a hole which will permit the assembling of the studs within torque limits specified in Table 1.

6. ASSEMBLING:

The torque required for driving a stud is a function of:

6.1 The smoothness of the thread in the tapped hole and on the stud.

6.2 The accuracy of the thread in the tapped hole and on the stud.

6.3 The accuracy of the lead threads. These and the stud end threads must bear a constant lead relationship.

6.4 The hardness and the physical properties of the material into which the stud is assembled.

6.5 The length of thread engagement.

6.6 The type and amount of lubricant used.

6.7 The quality, thickness and type of plating on the stud.

6.8 The interference fit between the stud and the hole is dependent upon the material the stud is driven into.

7. GENERAL:

It is very important that accuracy and the smoothness of the thread and the accuracy of the lead threads be maintained in order to be able to maintain the assembling torque within specification requirements.

7.1 The amount of interference fit required for assembling a stud within the torque specified varies. In soft cast aluminum, maximum interference is required and the amount decreases with increased hardness; also the amount of interference in magnesium is less than in aluminum for a given hardness of the material.

7.2 To guide in assembling of studs Table 2 forms a part of this specification showing the stud size, material, hardness of the material and the approximate interference fit.

TABLE 1

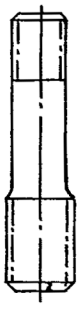
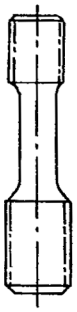
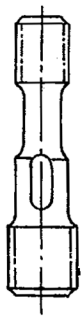
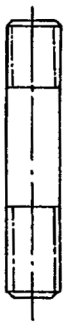
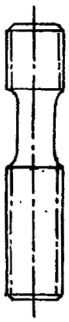
STEPPED STUDS					STRAIGHT STUDS			
TYPES X AND Y ARE DRIVEN FROM THE NUT END TYPE Z IS DRIVEN FROM THE STUD END		 TYPE X	 TYPE Y	 TYPE Z	TYPE X IS DRIVEN FROM THE NUT END TYPE Z IS DRIVEN FROM THE THREADS ON THE STUD END.		 TYPE X	 TYPE Z
STUD SIZE		TORQUE VALUE POUND-INCHES			STUD SIZE		TORQUE VALUE POUND-INCHES	
STUD END	NUT END				STUD END	NUT END		
.250-20	.190-32	25-55			.190-24	.190-32	25-40	
.3125-18	.250-28	50-125		50-165	.250-20	.250-28	50-105	50-105
.375-16	.3125-24	100-260		100-350	.3125-18	.3125-24	100-250	100-250
.4375-14	.375-24	175-525	175-350	175-600	.375-16	.375-24	175-400	175-400
.500-13	.4375-20	250-800	250-575	250-1000	.4375-14	.4375-20	250-700	250-700
.5625-12	.500-20	400-1300	400-925	400-1500	.500-13	.500-20	400-1100	400-1100
.625-11	.5625-18	600-1850	600-1300	600-2100	.5625-12	.5625-18	600-1600	600-1600
.6875-11	.625-18	900-2700	900-1900	900-3100	.625-11	.625-18	900-2200	900-2200

TABLE 2

SIZE OF STUD END	MATERIAL	SPEC. NO. (AMS)	BRINELL HARD 1000 KG LOAD	APPROX. INTERFERENCE FIT
.190-24	Cast Alum.	4210	50-80	.0037-.0057
	" "	4214, 4220, 4280	70-110	.0032-.0052
	Forg. Alum.	4142	60-90	.0035-.0055
	" "	4125, 4130	90-120	.0025-.0045
	" "	4121, 4135	120-160	.0015-.0035
	Cast Mag.	4424	60-95	.0025-.0045
	" "	4434, 4484	80-110	.0015-.0035
.250-20	Cast Alum.	4210	50-80	.0033-.0058
	" "	4214, 4220, 4280	70-110	.0028-.0053
	Forg. Alum.	4142	60-90	.0031-.0056
	" "	4125, 4130	90-120	.0020-.0045
	" "	4135	120-160	.0010-.0035
	Cast Mag.	4424	60-95	.0020-.0045
	" "	4434, 4484	80-110	.0010-.0035
.3125-18	Cast Alum.	4210	50-80	.0036-.0061
	" "	4214, 4220, 4280	70-110	.0031-.0056
	Forg. Alum.	4142	60-90	.0034-.0059
	" "	4125, 4130	90-120	.0022-.0047
	" "	4135	120-160	.0011-.0036
	Cast Mag.	4424	60-95	.0022-.0047
	" "	4434, 4484	80-110	.0011-.0036
.375-16	Cast Alum.	4210	50-80	.0038-.0063
	" "	4214, 4220, 4280	70-110	.0032-.0057
	Forg. Alum.	4142	60-90	.0035-.0060
	" "	4125, 4130	90-120	.0025-.0050
	" "	4135	120-160	.0012-.0037
	Cast Mag.	4424	60-95	.0022-.0047
	" "	4434, 4484	80-110	.0012-.0037